



Editorial

A tribute to Jean-Marie Herrmann



Jean-Marie HeRRmaNN, R2N2, . . . a holistic thinker. . . working for sustainability.

Clearly science is fascinating! It becomes even more captivating when you meet and work with the highest quality people, on a personal and scientific level. Jean-Marie Herrmann definitively belongs to this category and it is a real delight for us to dedicate this special issue of Applied Catalysis B to him.

Everyone knowing Jean-Marie (and especially those who have had the chance to travel with him) will have the most spicy anecdote to narrate! Attending a conference with him is a real life experience . . . But everyone will also immediately recognize his extraordinary hard work, his (almost) open mind, his unbelievable grasp of physical chemistry, strengthened by an incredible memory! He still remembers every moment of his scientific life (while we simply forgot what we did yesterday!)

Jean-Marie is a bright scientist who influenced not only his students but also the whole field of heterogeneous catalysis and especially photocatalysis. He is well known for his wide and bright knowledge, as well as for his warmth.

His accomplishments, his citizenship in the community, his friendship and mentoring of so many young scientists, and his absolute devotion to photocatalysis, but also to his family (in his rare remaining free time), and to his friends, put Jean-Marie at the forefront as an outstanding colleague and friend. As a colleague, we can admire on a daily basis his astonishing ability to overcome nearly any difficulty in his way!

Jean-Marie Herrmann graduated in 1969 from ESCIL (Ecole Supérieure de Chimie Industrielle de Lyon) at Lyon . . . as the best student in his class (we warned you, he is bright).

Jean-Marie's chemical imagination, his chemical interests, and his curiosity are essentially unbounded. He did his PhD under the supervision of Professor Stanislas J. Teichner, one of the discoverers of titania-based photocatalysis at IRC (Institute of Research on Catalysis). His subject was the elucidation of the nature of structure defects and of active sites on anatase, induced by different pretreatments. In particular, he demonstrated the formation of neutral, singly and doubly ionized anionic vacancies, responsible for the generation of active oxygen species for oxidation catalysis (1969–1973).

In 1974–1975, he was a postdoctoral fellow at Northwestern University (Evanston, USA) under the supervision of Professor Robert L. Burwell (1913–2003), president at that time of the North American Catalysis Society (NACS). Jean-Marie Herrmann was initiated to catalysis by metals. He developed a chromatographic method of hydrogen chemisorption to determine the dispersion of Pt catalysts before testing their activities in deuterium–cyclopentane isotope exchange. From the in-depth analysis of the products, he demonstrated that this elegant reaction is structure sensitive.

Back in France in 1975, he joined the photocatalysis team at IRC, just after the departure of Pr. S.J. Teichner. He developed in situ photoconductivity measurements on titania and on other pure oxides to determine the formation of photo-electrons and holes, accountable for redox reaction processes. He also highlighted the nature of the active oxygen species involved in the selective mild oxidation of hydrocarbons, performed in the gas phase and later on in the liquid phase. His activity in the area of photoconductivity also demonstrated the prime role of two ionosorbed species: O_2^- already detected by ESR, and O^- , which actually was the precursor of the atomic oxygen species responsible for the almost 100% selective oxidation of hydrocarbons into aldehydes or ketones.

Under the influence of electrochemists, photocatalysis progressively moved to aqueous media. Jean-Marie Herrmann made the distinction between (i) dry organic media (gas and liquid) leading to mild selective oxidations and (ii) aqueous media (water or humid air) leading to total non selective oxidations owing to the formation of OH^\bullet radicals, originating from the oxidation of water by photo-holes.

A long series of organic pollutants were successfully totally mineralized into $CO_2 + H_2O$ and to inorganic anions (SO_4^{2-} , NO_3^- , $H_2PO_4^-$, . . .). Inorganic toxic ions were oxidized to their highest oxidation state, becoming totally innocuous. For dye removal from

waters, he showed that the azo-groups —N=N— of azo-dyes (which represent 40–45% of all industrial dyes) were 100% selectively degraded into dinitrogen N_2 , which constitutes a specifically “environmentally friendly” reaction. All these results were obtained in close collaboration with Dr. Chantal Guillard and Dr. Eric Puzenat.

At the end of the seventies, Jean-Marie Herrmann also studied the photocatalytic production of hydrogen in (not from) water and in pure organic phases, both gas and liquid. Using his competences in catalysis by metals, acquired with R.L. Burwell, he could exhaustively determine the laws of bi-functional catalysis.

At the same time, he studied the photocatalytic deposition of noble metals used (i) to synthesize metallic as well as bimetallic catalysts using soft chemistry routes and (ii) to recover noble metals in diluted electrolytic baths, especially Ag from argentic photography.

After 1995, Jean-Marie Herrmann worked in solar photocatalytic engineering at the Solar Platform of Almeria with Pr. Sixto Malato. His great satisfaction was that the fundamentals of photocatalysis elaborated in the laboratory were successfully scaled up by 4 orders of magnitude. He then successfully applied his skills to the potabilization of water or self-cleaning of buildings and later on to the degradation of micro-organisms (bacteria, viruses, etc.) in different phases.

Jean-Marie Herrmann constantly took care of the academic and pedagogic aspects of photocatalysis to promote it as a true science and a new discipline in the area of catalysis.

In his later career, he faced a new “structure-sensitive” relationship in his administrative appointments as active and selective director of LACE and as Deputy-Director of IRCELYON.

He was awarded in 2007 the Grand Prix of the French Academy of Sciences for Chemistry (Gaz de France Award) for his achievements.

Jean-Marie was and still is a reference for his colleagues and students, catalyzing scientific exchanges around him. . . a place to be! There is always something to learn from him.

Working and sharing our time with have been truly inspiring! R2N2 is as an outstanding citizen of the chemical community.

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